3.3.3 Aquatic Management Indicator Habitats

Lake and Stream Health (Indicator 14)

Indicator 14 represents the suite of indicators used in Chapter 3.6 Watershed Health to evaluate the impacts of management on watershed health, fish habitat, and riparian resources. Key indicators evaluated are those that address the trend of watershed impacts from transportation system (Indicator 1 from Watershed Management Section 3.6.1) and the amount of riparian timber harvest and its affect on coarse woody debris in riparian zones (Indicators 3 and 4 from Riparian and Fish Habitat Management Section 3.6.2). The effects of the alternatives on watersheds, fish habitat, and riparian areas are addressed primarily in Chapter 3.6, but additional wildlife effects analysis is presented in this section in order to address species of management concern that are associated with a wide variety of aquatic habitats.

Analysis Area

For aquatic habitat, aquatic and riparian indicators are assessed at various landscape and watershed scales described in detail in Chapter 3.6.1 (Watershed management) and 3.6.2 (Riparian and Fish Habitat Management). In general the analysis area for direct and indirect effects includes National Forest lands within the proclamation boundaries of the National Forests. For the Superior, the assessment of some indicators of watershed health includes the BWCAW, while other assessments are focused outside the BWCAW

For aquatic species, the area covered by the cumulative effects analysis is the entirety of the 10-digit Hydrologic Unit Code watersheds that intersect or are wholly included within the boundaries of the Chippewa and Superior National Forests.

3.3.2.a Affected Environment for Lake and Stream Health (Indicator 14)

Lakes, streams, and ponds on the Chippewa and Superior National Forests provide a wide variety of environmental conditions, in terms of water quality, physical attributes, wildlife species assemblages, and human development. Aquatic habitats in healthy functioning condition generally provide habitat for a diverse assemblage of aquatic and terrestrial species that require aquatic environments to meet all or part of their habitat needs, including numerous species of management concern. See Table WLD-14 below and WLD-10 in Section 3.3.1 above for examples of species of management concern associated with aquatic and riparian habitats.

As described in more detail in Chapter 3.1.2, water is a major feature on both National Forests. Riparian areas (lakes, streams, wetlands) cover approximately 49% and 34% respectively of the land within the proclamation boundaries of the Chippewa and Superior National Forests. There are over 350,000 acres of surface water on the Chippewa and over 450,000 acres on the Superior. There are an estimated 920 miles of rivers and streams on the Chippewa and over 2,000 miles on the Superior. In addition there are numerous small ponds and marshes, semi-permanent and seasonal ponds and intermittent streams.

On both Forests, water quality of most lakes and streams is generally good to excellent, while the quality of other waterbodies such as intermittent streams or seasonal ponds is not generally known. This ranking of water quality relies most on chemical attributes of the water because in the past, managers monitored lake and stream “health” through chemical sampling of surface waters. This focus on chemical sampling has often overlooked the more harmful effects of landscape alterations and non-point source pollution on the quality of lake and stream environments, because chemical or physical survey

approaches alone cannot measure complex attributes such as ecological health or "biotic integrity" (Karr 1991). Landscape alternations and watershed disturbances such as road building, development, stream channelization, alteration of riparian zones, and others may contribute to an overall decrease in the physical, chemical, and biological quality of lakes and streams. Thus, other aspects of lake and stream health may not always be in good or excellent health. A thorough inventory of lake and stream health is not yet available.

Even for lakes and streams with good or excellent quality, land use and management activities of the many various landowners, including those of the National Forests, has had, and is likely to continue to have, both site-level and landscape level impacts on lake and stream health. In order to protect these systems, we need to look at indicators that integrate the effects of physical, chemical, and biological stressors (Niemela and Feist 2002).

Table WLD-14: MIH 14 – Lake and Stream Health associated species of management concern

Superior	Chippewa
Lakes and streams in a variety of sizes, with or without current	
Bald eagle, shortjaw cisco, lake sturgeon, black tern, wood turtle, northern brook lamprey, sensitive mussels, Walleye, lake trout, northern pike and other game fish, common loon, muskie, osprey, river otter, snapping turtle, wild rice, beaver, mink, variety of ducks, moose	**bald eagle, common & Caspian terns (>50,000 acres), black tern, greater redhorse, a variety of sensitive plants, sensitve freshwater mussels, least darter,** walleye, muskie, northern pike, and other game fish, common loon, wild rice, beaver, mink, variety of ducks, moose
Smaller lakes, marshes, ponds, small stream segments, with or without current	
northern brook lamprey, black tern, Wilson's phalarope, sensitive mussels, variety of sensitive plants, brook trout	**Trumpeter swan, pugnose shiner, sensitive mussels, Vertree's caddisfly, Blandings turtle, Black tern, Blanding's turtle, Wilson's phalarope, variety of sensitive plants**
Fishless ponds, vernal & temporary ponds,	
Variety of sensitive plants, Blue-spotted salamander, wood frog	**Variety of sensitive plants**, **four-toed salamander,** Blue-spotted salamander, wood frog

Species in bold type are threatened, endangered or sensitive (TES)

3.3.2.b Environmental Consequences for Lake and Stream Health Indicator 14

Effects Common to All Alternatives

Chapters 3.6.1.b and 3.6.2.b list laws, regulations, policy and forest plan direction and implementation that addresses watershed health and riparian and fish management. The desired condition and objectives of all alternatives is to maintain or improve conditions. For wildlife, of key importance are those elements of lake and stream health that address hydrologic process, including stream flow, riparian conditions, water temperature, habitat connectivity, sedimentation, and others.

In addition to management direction listed for watersheds and riparian areas, the alternatives provide direction for protecting, maintaining or enhancing habitat for sensitive aquatic species. Alternatives also emphasize promoting productive fish populations to support sustainable recreational and subsistence fisheries while meeting the needs of fish-dependant threatened, endangered, or sensitive wildlife species.

General Effects Common to All Alternatives for Indicator 14

Impacts to watersheds from management practices and activities of the alternatives can affect overall lake and stream health. The projected amounts of these activities may vary greatly among alternatives but each is associated with set characteristics or potential effects that, while shaping watershed health, affect the quality and health of aquatic habitat for species.

Chapters 3.6.1 and 3.6.2 describe impacts typical of these management practices.

Varied impacts on lake and stream health from the alternatives result in a range of both negative and positive effects. These in turn result in varied amounts, distributions, and conditions of habitats for species that depend on aquatic and riparian habitats. Although there may be a variety of potential negative impacts from management, overall, all alternatives are expected to maintain or improve watershed quality from current conditions. All alternatives provide conditions that are likely to maintain viability for all native and desired non-native species, including sensitive species. All alternatives also provide conditions that can support productive and sustainable fisheries.

Direct and Indirect Effects for Lake and Stream Health (Indicator 14)

Chapters 3.6.1 and 3.6.2 describe the direct and indirect effects, applicable to both the site- and landscape level, for the indicators for watershed health, riparian areas, and fish habitat and compare them to the current condition described in affected environment section above. These effects translate well to impacts on wildlife associated with lakes and streams because the higher the quality of watersheds, riparian areas, and fish habitat, the more beneficial the impacts on aquatic species. In other words, no species of management concern benefit from degraded lake and stream health.

Alternatives B and D

Alternatives B and D consistently provide the conditions for as quickly as possible obtaining the desired conditions and objectives for improving watershed health, riparian areas, and fish habitat resources for Forest Plan alternatives. Through a proactive riparian management approach, these alternatives provide a high level of coarse woody debris to lakes, streams, and wetlands, and provide for a very high level of bank stability, shading, and allochthanous material inputs to lakes and streams. In addition, these alternatives have a very low level of new road, trail, and water access construction, which will ensure habitat connectivity in rivers and streams, and potentially lower rates of sedimentation in lakes and streams than currently exists. Increases in the amount of coarse woody debris, maintenance of habitat connectivity, shading and allochthanous material, and lower rates of sedimentation in habitats will all help to improve both site-level and landscape level health and diversity of species community assemblages in lakes, streams, and wetlands, as well as protect water quality.

These alternatives are likely to be beneficial in moving existing watershed health, riparian areas, and fish habitat resource conditions further toward the desired conditions. This will improve habitat conditions for species of management concern from existing conditions. The potential for negative impacts to species from management activities on the National Forests is low to very low.

Alternative F

Vegetation objectives in Alternative F were set to reflect natural disturbance regimes and mimic those disturbances within the range of natural variability. Even though Alternative F does not have a proactive riparian management approach, the vegetation disturbances within the watershed would reflect natural conditions, so that functions and attributes of lakes, streams, wetlands, and riparian zones should be retained. For both the Chippewa and Superior, this alternative results in a low level of regeneration-type timber harvest in riparian zones (around lakes, streams, and wetlands). This low level of even-age timber management in riparian zones benefits those species requiring downed logs and coarse woody debris in lakes, streams, and wetlands, such as turtles, waterfowl, furbearers, and fish. Alternative F also has a low level of road and trail construction for both the Chippewa and Superior, which would benefit those species that require connectivity between aquatic habitats, such as walleye, freshwater mussels, greater redhorse, northern brook lamprey, least darter, and others.

This alternative is likely to be beneficial in moving existing watershed health, riparian areas and fish habitat conditions further toward the desired improved conditions. This will improve habitat conditions for most species of management concern from existing

conditions. The potential for negative impacts from this alternative is low.

Alternative G

Alternative G has a proactive riparian management approach, so that riparian zones would be managed to protect or restore riparian and aquatic functions. This approach is beneficial to lake and stream communities. This alternative has a moderate level of road and trail construction, with a moderate increase in stream crossings and a potential for fragmentation of aquatic habitats. It has a moderate amount of even-age timber management in riparian zones around wetlands, which may affect amphibians and sensitive plants that require coarse woody debris and shading.

This alternative is likely to be beneficial in moving existing watershed health, riparian areas, and fish habitat conditions further toward the desired conditions. While this alternative may have negative impacts on some species, overall it will improve habitat for species of management concern from existing conditions.

Modified Alternative E

Modified Alternative E has a proactive riparian management approach, so that riparian zones would be managed to protect or restore riparian and aquatic functions. This approach is beneficial to lake and stream communities. This alternative has a moderate to relatively high level of regeneration-type timber harvest in riparian zones, due to harvest in and around wetlands. This may have an effect on amphibians and sensitive plants in and around wetlands. In addition, Alternative E allows the highest level of water access and trail construction (higher than currently exists). Highly developed water access is likely to take place on larger lakes, and potentially may effect feeding or breeding of species in that habitat type, including bald eagle, common and Caspian tern, osprey, as well as fish species. More highly developed boat accesses may increase the potential for introduction of non-native invasive aquatic species that may displace species of management concern through alterations of their habitat.

This alternative is likely to be beneficial in moving existing watershed health, riparian areas and fish habitat conditions further toward the desired conditions although not as quickly as Alternative B and D, F or G. This alternative may potentially impact some aquatic species, especially those that are sensitive to human disturbances or non-native invasive species. Management guidance for protecting or restoring habitat for sensitive species will minimize adverse impacts and should make it likely that on the landscape scale these species will maintain viability as this alternative gradually improves habitat conditions from existing conditions.

Alternatives A and C

Alternatives A and C consistently display a high potential to affect lake, stream, and wetland health. Both alternatives plan a high level of even-age management in riparian zones, and rely on a mitigative approach to minimize resource degradation. These alternatives have a high level of road and trail construction and large increases in the number the stream crossings. These activities have the potential to fragment aquatic habitats and increase sedimentation of lakes, streams, and wetlands. Alternatives A and C also have a high level of water access development, with a high potential for the spread of non-native invasive aquatic species, which would be detrimental to aquatic vegetation communities and a number of fish and bird species. Alternative C allows cross-country ATV use for big game retrieval only, which may impact sensitive wetland plant habitats, nesting turtles, and aquatic communities. These alternatives will maintain existing watershed health, riparian areas, and fish habitat conditions because standards and guidelines will help reduce risk to riparian and aquatic systems. These alternatives have potential for negative impacts on some aquatic species. Management guidance for protecting or restoring habitat for sensitive species will minimize adverse impacts and should make it likely that on the landscape scale this alternative will maintain viability as this alternative maintains habitat conditions at existing conditions.

Cumulative Effects for Lake and Stream Health (Indicator 14)

See Chapter 3.6.1 for cumulative effects analysis on watershed health that influences aquatic habitats.

Generally, cumulative effects can be viewed for two different types of land use: 1) forest uses that include vegetation, timber, watershed, and wildlife management and 2) human use and development.

For forest uses, Alternatives B, D, Modified E, F, and G will cumulatively contribute, to varying degrees and in varying timeframes, to improving lake and stream health and provide an overall beneficial impact to species. Alternatives A and C will maintain lake and stream health through standards and guidelines that help reduce potential risk to riparian and aquatic systems and their associated species. Impacts to watersheds from other ownerships are likely to both benefit and negatively impact lake and stream health at site-levels. On lands managed for timber, such as State, County, and private timberlands, water quality and riparian and aquatic habitats are likely to be maintained if voluntary site-level guidelines for riparian areas, soils, roads, and rare species are implemented. In these situations the cumulative effects of the alternatives will likely be similar to the direct and indirect effects, though the overall rate and degree of improvement may be less than that on National Forest lands.

For other human uses and developments, differences in cumulative effects among the alternatives may be lower when considering other external factors affecting lake and stream health. Other landowners play a large role in affecting lake and stream quality. For example, on the Chippewa, approximately 70% of the total riparian acreage (within 200 feet of lakes, streams, and open water wetlands) is managed by State, County, private, or Tribal entities. On the Superior, 46% of the total riparian acreage is in other ownership.

Land ownership within both National Forests is fragmented and trends for increasing levels of private development on all ownership, road, trail and water access development, water-based recreation, and habitat fragmentation will all potentially contribute to negative impacts such as shoreline erosion, barriers to migration and habitat connectivity, sedimentation, changes to water quality. Based on cumulative effects the National Forests have limited ability to change overall conditions affected by these factors, but still may have the ability to benefit local conditions for species of management concern.

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